United States Department of Agriculture

North Fork Republican Watershed

Natural Resources Conservation Service

Hydrologic Unit Code 10250002

Lakewood, Colorado

Rapid Assessment

RWA 10250002

December 2008

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Introduction

Background Information

The Natural Resources Conservation Service (NRCS) is encouraging the development of rapid watershed assessments in order to increase the speed and efficiency generating information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers.

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

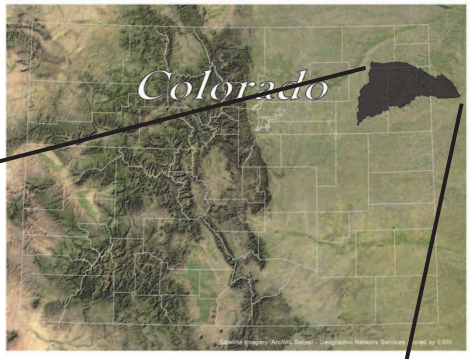
Benefits of these Activities

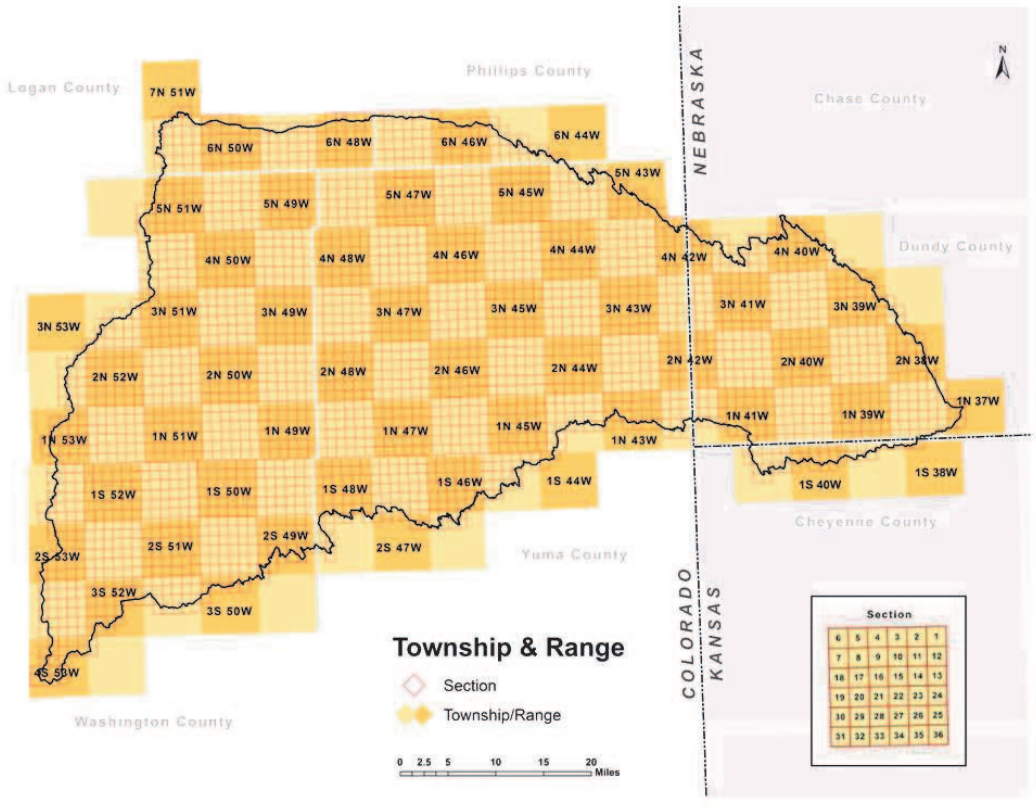
While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

- Quick and inexpensive tools for setting priorities and taking action
- Providing a level of detail that is sufficient for identifying actions that can be taken with no further watershed-level studies or analyses
- Actions to be taken may require further Federal or State permits or ESA or NEPA analysis but these activities are part of standard requirements for use of best management practices (BMPs) and conservation systems
- Identifying where further detailed analyses or watershed studies are needed
- Plans address multiple objectives and concerns of landowners and communities
- Plans are based on established partnerships at the local and state levels
- Plans enable landowners and communities to decide on the best mix of NRCS programs that will meet their goals
- Plans include the full array of conservation program tools (i.e. cost-share practices, easements, technical assistance)

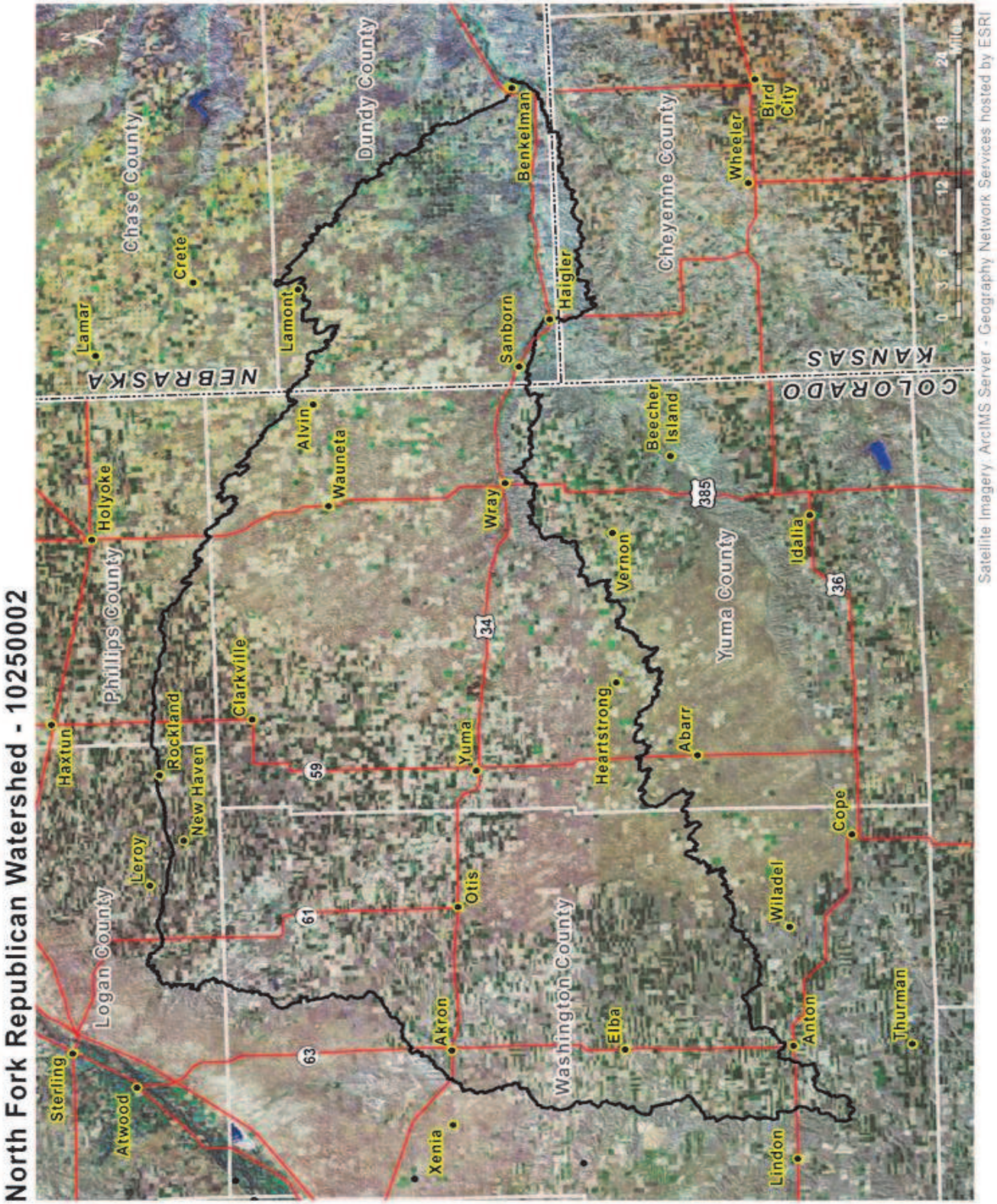
Rapid Watershed Assessments provide information that helps land-owners and local leaders set conservation priorities.

The North Fork Republican Watershed is located in the Republican River Basin, on the eastern plains of Colorado. The watershed is 1,887,622 acres in size, with approximately 1200 farms and ranches covering 1,939,608 acres in the watershed. As of April 2005, there were 106,384 acres of land in the Conservation Reserve Program.





COLORADO County	County Acres	County Acres in NORTH FORK REPUBLICAN Watershed	% of County in the Watershed	% of Watershed in the County
Logan	1,180,481	71,789	6.1%	3.8%
Phillips	440,331	46,649	10.6%	2.5%
Washington	1,615,062	672,855	41.7%	35.6%
Yuma	1,516,787	783,437	51.7%	41.5%
KANSAS				
Cheyenne	654,065	18,078	2.8%	1.0%
NEBRASKA				
Dundy	589,983	294,814	50.0%	15.6%
		1,887,622		


North Fork Republican Watershed - 10250002
NEBRASKA
COLORADO
KANSAS
Chase County
Dundy County
Cheyenne County
Phillips County
Logan County
Yuma County
Washington County
Lamar
Crete
Lamont
Benkelman
Wheeler
Bird City
Haigler
Sanborn
Alvin
Wauneta
Holyoke
Beecher Island
Wray
Vernon
Idalia
Haxtun
Rockland
Clarkville
New Haven
Leroy
Yuma
Heartstrong
Abarr
Cope
Otis
Wiladel
Akron
Elba
Anton
Thurman
Sterling
Atwood
Xenia
Lindon
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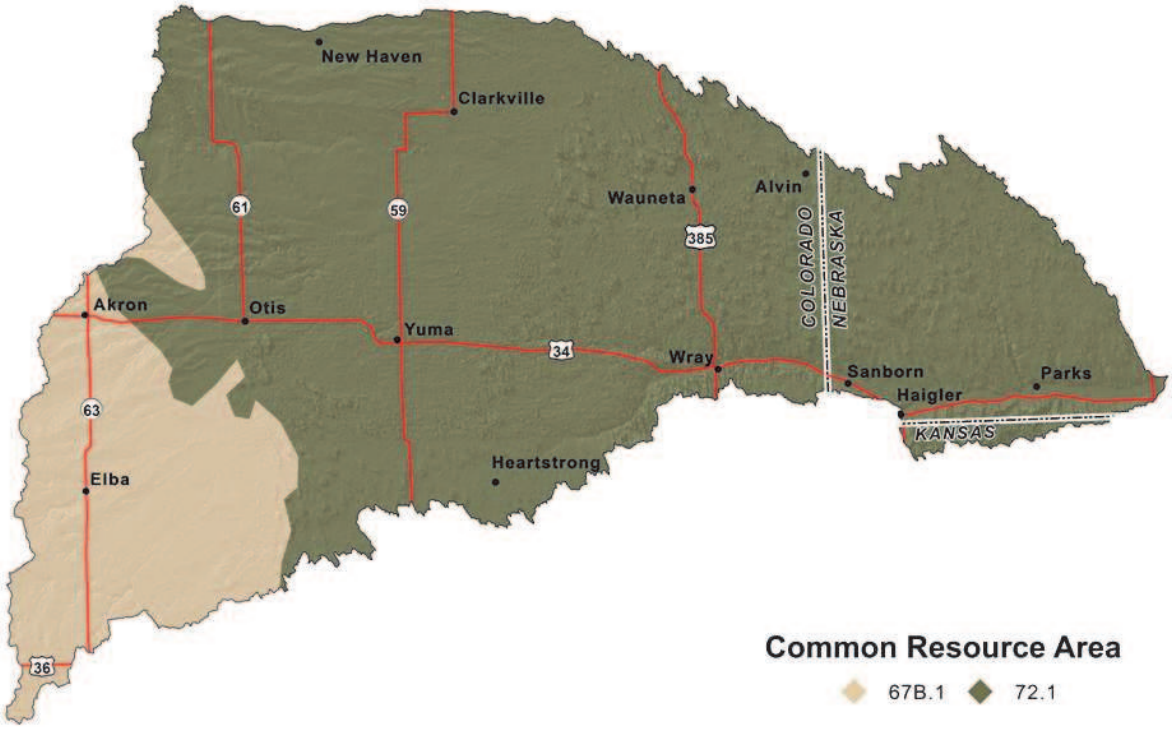
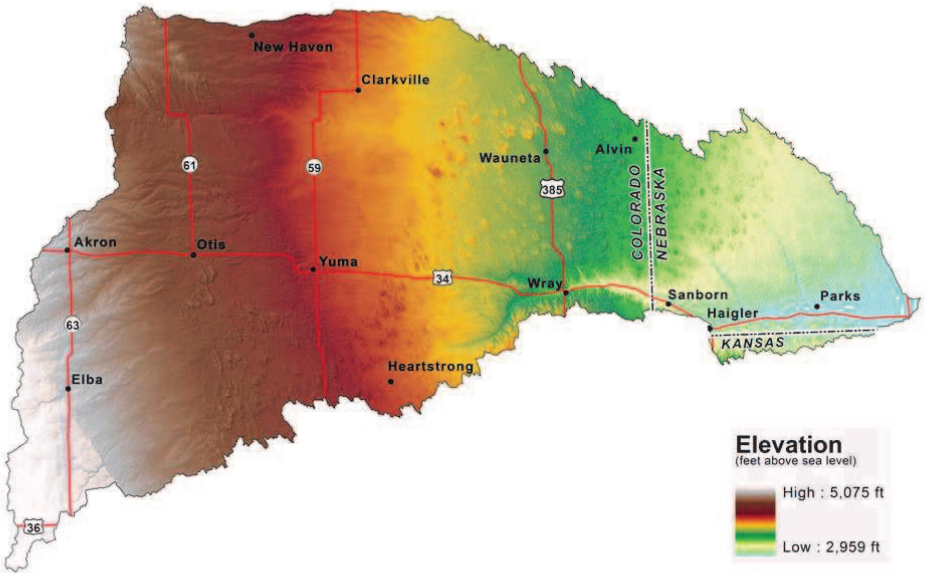
Satellite Imagery: ArcIMS Server - Geography Network Services hosted by ESRI



Common Resource Areas (CRA): Geographical areas where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

MLRA	CRA	CRA NAME	CRA DESCRIPTION
67B	**67B.1**	Central Great Plains, Southern Part	The Central High Plains, Southern Part CRA is broad, undulating to rolling plains dissected by streams and rivers. Local relief is measured in tens of feet on the plains. Soils are deep and formed in eolian and alluvial materials. Presettlement vegetation was short grass prairies. Nearly all of this area in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
72	**72.1**	Central High Tableland	The Central High Tableland CRA is broad, level to gently rolling, loess mantled tableland. Local relief is measured in feet on the tableland tens of feet and major river valleys bordered by steep slopes. Soils are deep . Presettlement vegetation was short grass prairies. Nearly all of this area in cropland, both dryland small grain crops and irrigated corn and grain sorghum.

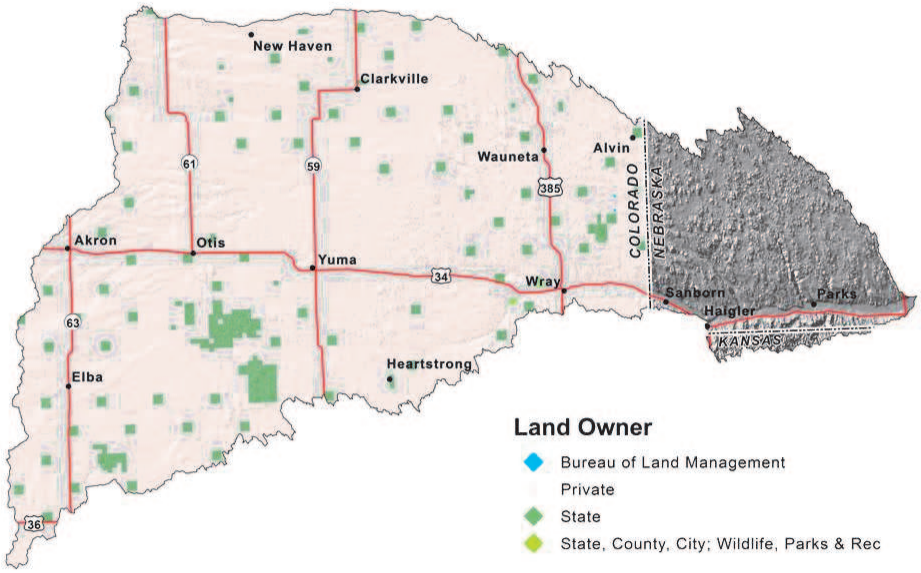
Physical Description

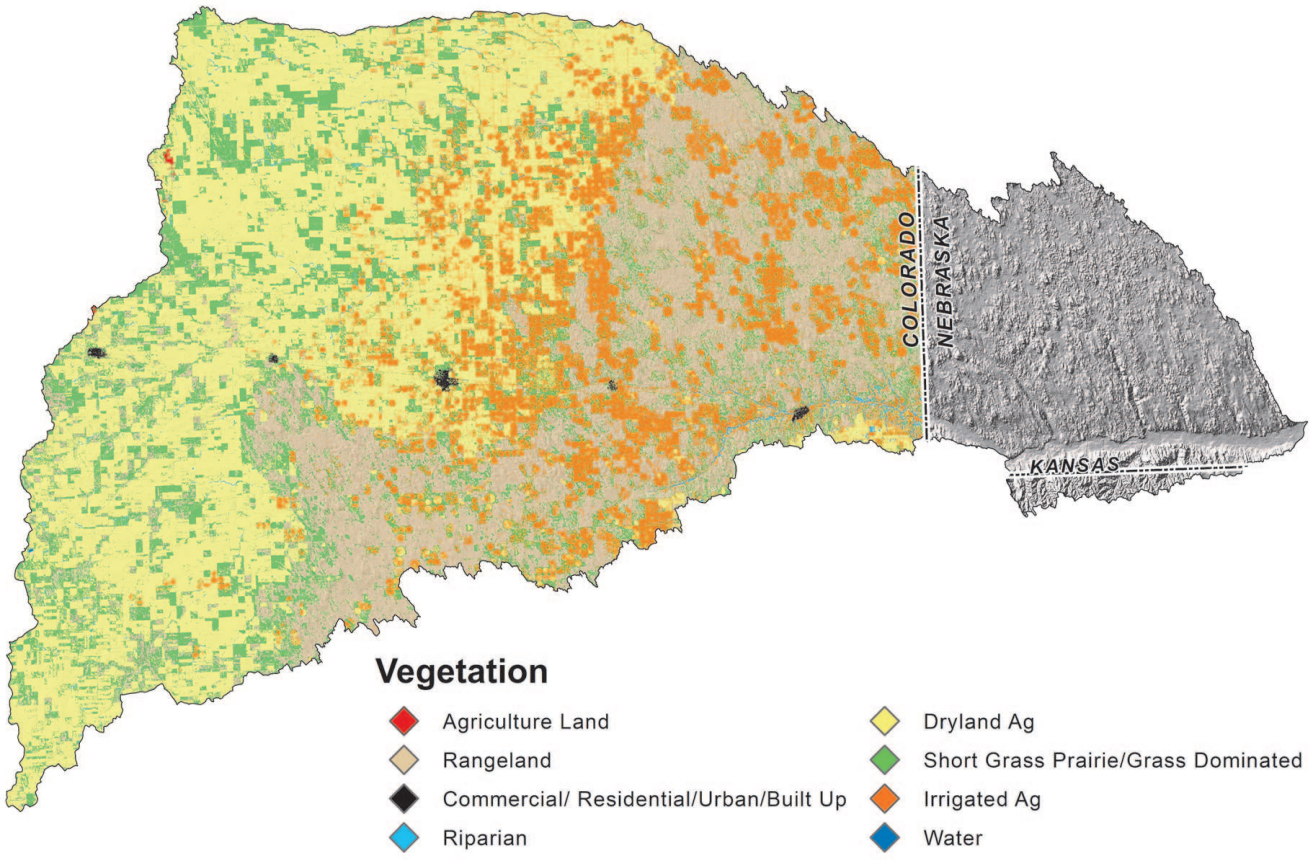


The North Fork Republican Watershed consists of broad, inter-valley remnants of smooth plain, with gently rolling slopes, punctuated by steeper slopes along the drainages. The North Fork of the Republican River bisects deep, well-drained soils overlaying the Ogallala formation, and cuts into Cretaceous Pierre shale on the eastern edge of the watershed. The predominant land use is agriculture, consisting of cash grain farming and livestock production. Cropland is dominated by dryland winter wheat rotations, and corn and grain sorghum production in areas where irrigation is available. Steeper slopes are generally in native grasses and used for livestock grazing.

Land Ownership

Approximately1,497,322 acres in the Colorado portion of the North Fork Republican Watershed are privately owned. There are 77,375 acres of state controlled land and 80 acres of federally controlled lands.

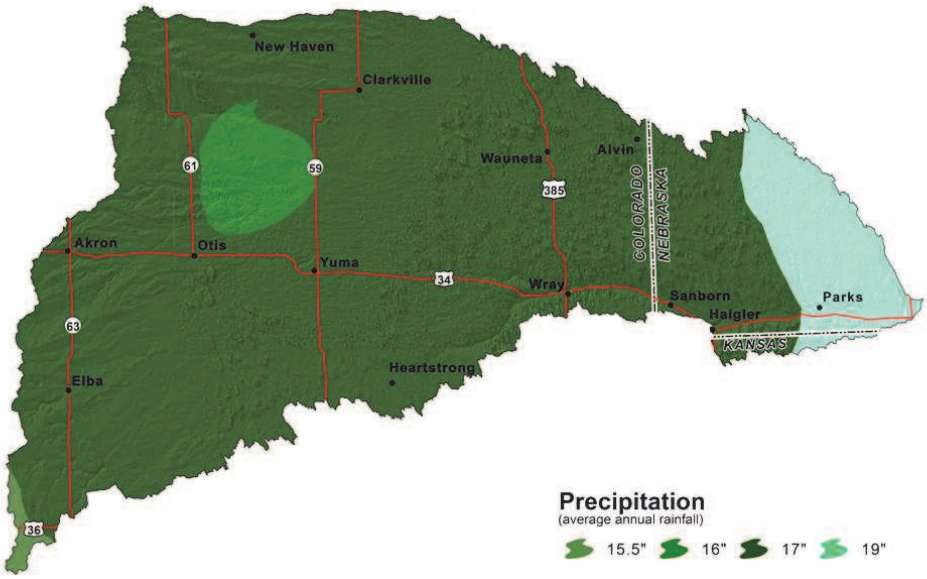




North Fork Republican Land Use

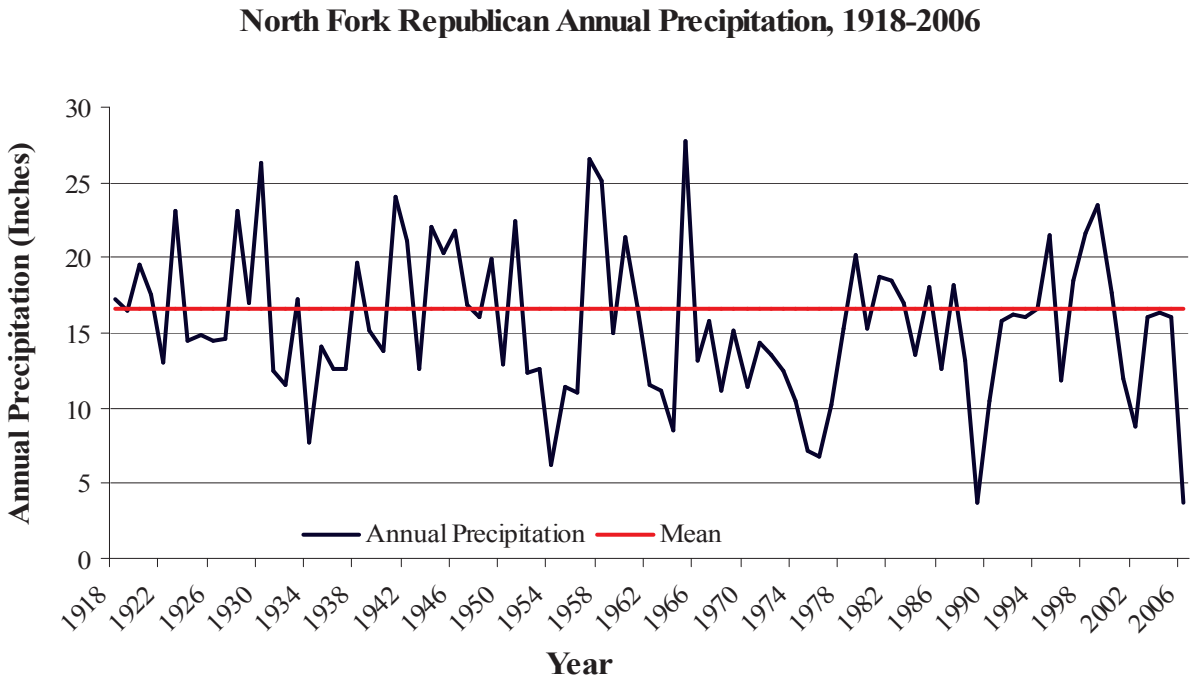
Land Use	Land Use Acreage	Vegetation	Vegetation Acreage
		Agriculture Land	437.26
Cropland	855,991	Dryland Ag	616,883.19
		Irrigated Ag	238,670.93
Rangeland/Grassland	707,126	Grass Dominated	310,143.62
		Grass/Forb Mix	18,803.86
		Grass/Yucca Mix	1,763.07
		Sagebrush Community	64.45
		Sagebrush/Grass Mix	376,350.58
Riparian	9,417	Cottonwood	3.79
		Herbaceous Riparian	8,934.96
		Riparian	8.41
		Shrub Riparian	469.68
Water	28	Water	28.20
Other	2,189	No Data	8.73
		Commercial	1,023.41
		Residential	1,156.99
Total Colorado Acres			**1,574,751**

Precipitation



Precipitation in the North Fork Republican watershed averages around 17 inches per year. Droughts are common in the watershed, as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. The first took place in the 1910s, and another, in the '30s, caused the dust-bowl period. The second worst drought on record in the state occurred in the mid-50s, when a series of hot, dry summers following a period of scant mountain snowpack created water shortages. The fourth serious drought hit parts of Colorado in the late 1970s. In this century, the most severe drought since 1723 hit the state in 2002. Prior to the 1700's, researchers looking at tree ring records found evidence of droughts, even more severe than those during the record period, with some lasting many years.

Rainfall in the watershed typically occurs as frontal storms in the spring and early summer, and as high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn, and precipitation in winter is snow. The average annual temperature is from 35 to 66 degrees F. The frost free period averages 154 days but ranges from 106 to 187 days.



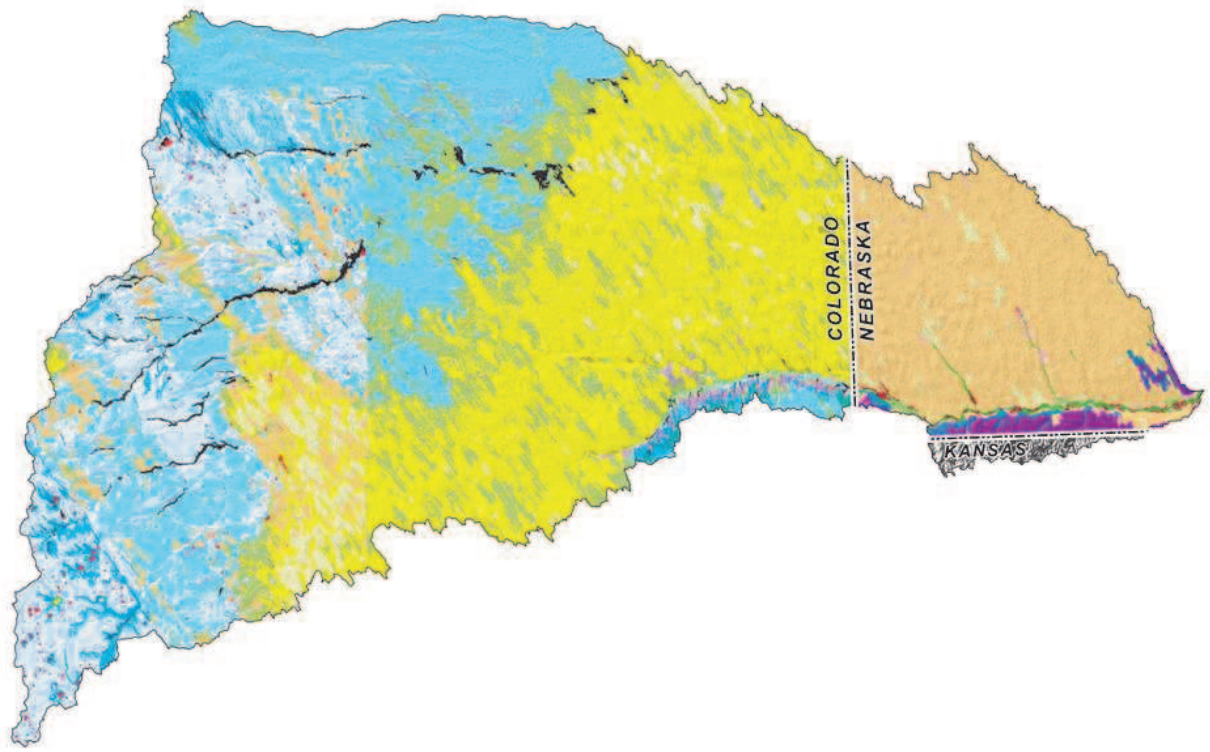
Ecological Sites

The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

Ecological Site maps give an overall indication of the soils plant relationship in the area. More detailed descriptions of ecological sites are provided in the Field Office Technical Guide (FOTG). The FOTG is available in local offices of the Natural Resources Conservation Service (NRCS) and online at http://www.nrcs.usda.gov/technical/efotg/.

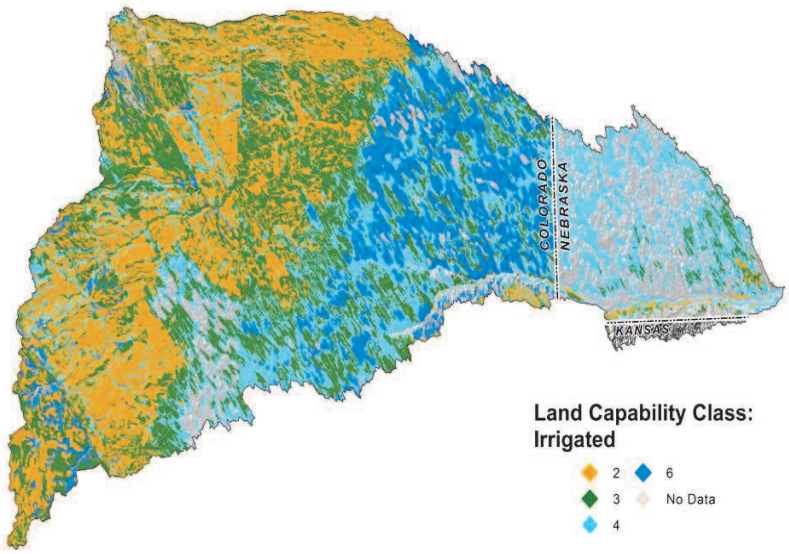
Soil: Ecological Site Name

- Alkaline Plains
- Choppy Sands
- Clayey - veg. zone 2
- Clayey Plains
- Closed Upland Depression
- Deep Sand
- Gravel Breaks
- Limestone Breaks
- Limy Upland
- Loamy (formerly Loamy Plains)
- Loamy Bottomland
- Loamy Plains
- Loamy Slopes
- Loamy Upland
- Loess Breaks
- No Site - Veg. zone 2
- Overflow
- Plains Swale
- Saline Lowland
- Saline Subirrigated
- Salt Flat
- Salt Meadow
- Sandy
- Sandy Bottomland
- Sandy Meadow
- Sandy Plains
- Shallow Limy
- Shallow to Gravel - Veg. zone 2
- Subirrigated
- Wet Meadow
- No Data



Land Capability Classification

shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

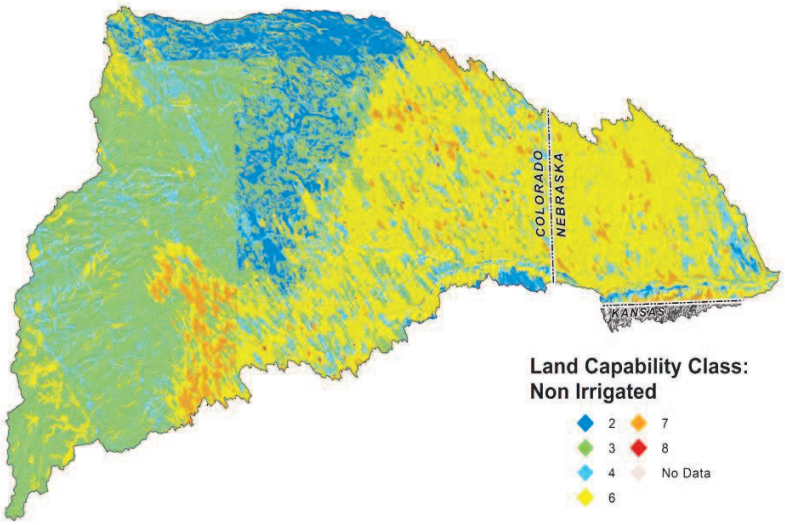


Land Capability Classes

Class 1 - soils have few limitations that restrict their use.

Class 2 - soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 - soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.



Class 4 - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

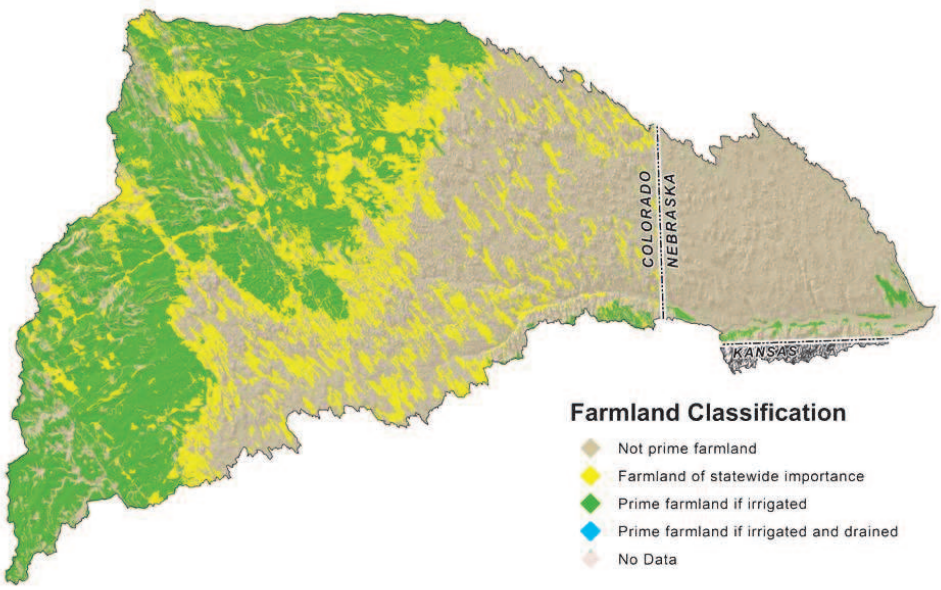
Class 5 - soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 - soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 - soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.

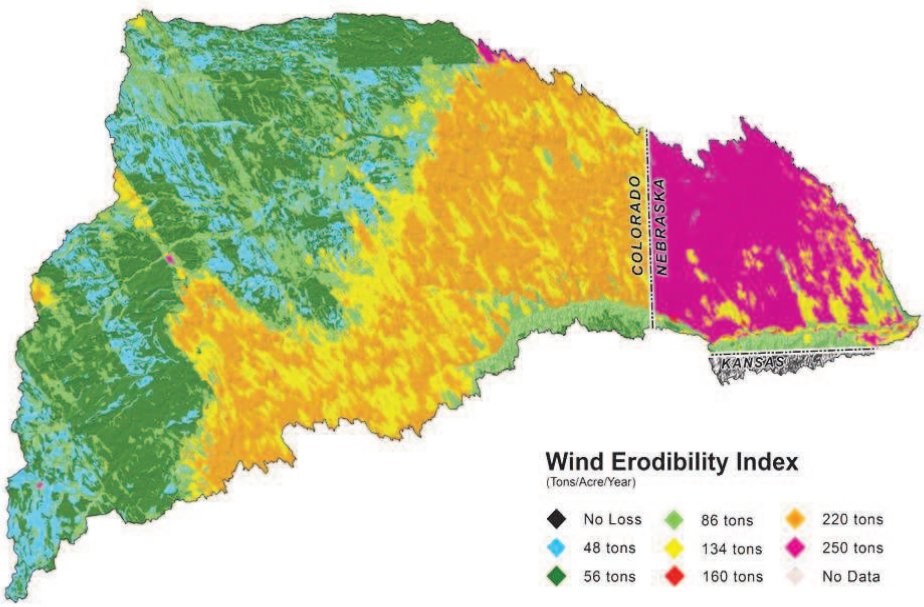
Farmland Classification



Prime farmland is land that has the best combination of physical characteristics for producing food, feed, forage, fiber and oil seed crops and is also available for these.

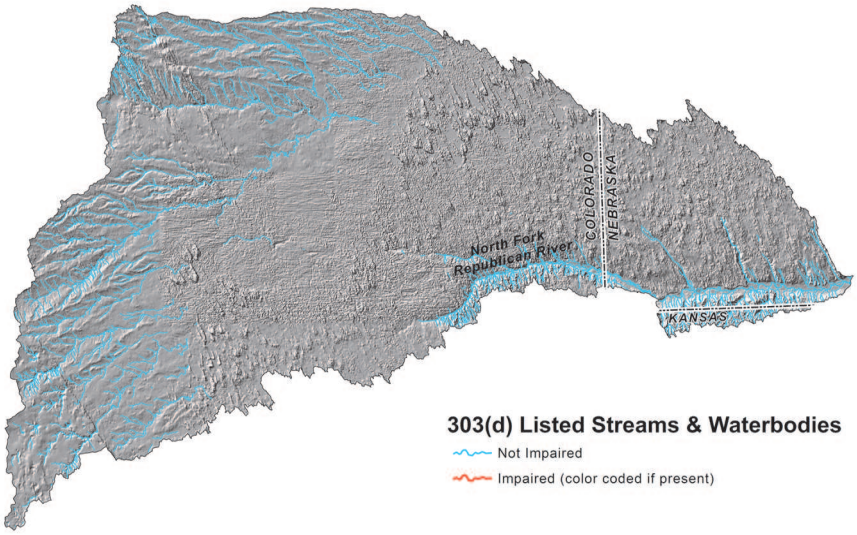
Colorado had approximately 1,696,800 acres of nonfederal prime farmland recorded in 1997. This represents over 2 percent of the states total land area or 4 percent of the nonfederal land in Colorado. Nationally. 64 percent of soils classified as prime farmland are being used for cropland. In Colorado, 93 percent of the soils classified as prime farmland are being utilized as cropland.

The Wind Erodibility Index (WEI)—numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management. Soils with an erodibility index equal to or greater than 8 are considered highly erodible.



Surface Water Quality

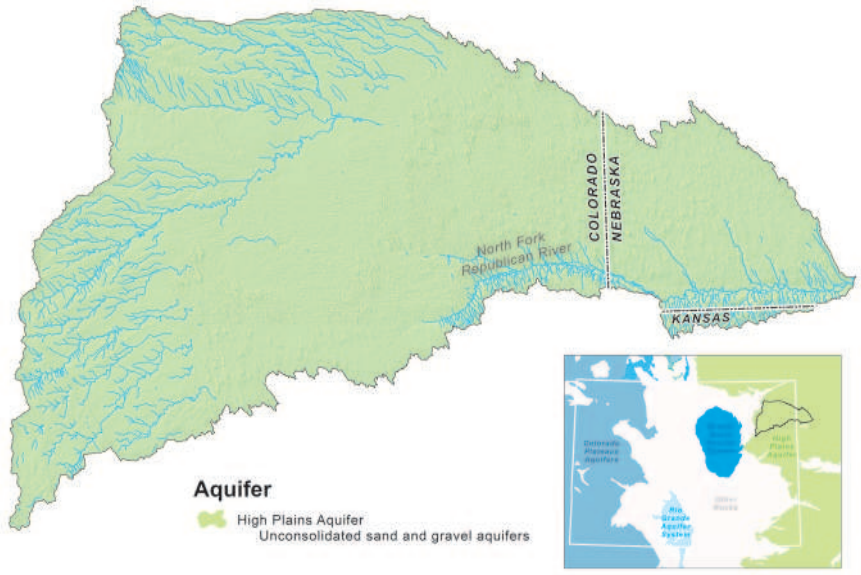
Surface water quality in the North Fork Republican Watershed is generally good. Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met for designated uses. As indicated in the map, there are no 303(d) listed streams in the watershed. The North Fork of the Republican River is designated as Secondary Contact Recreation, Aquatic Life Warm 2, and Agriculture. Updates to the 303d/TMDL list can be found at: http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303dtmdlpro.html



Ground Water

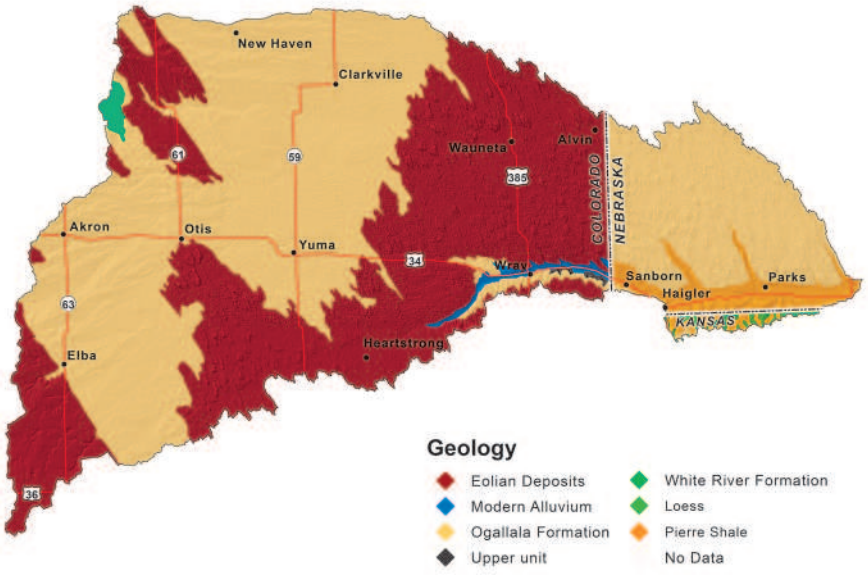
The High Plains Aquifer underlies the North Fork Republican watershed, and consists of the Ogallala formation, the Brule formation, and shallow Quaternary sand and gravel deposits. The aquifer is the primary source of irrigation and domestic water for the area. The High Plains aquifer is an extensive regional aquifer that underlies the Great Plains states extending from South Dakota on the north to Texas and New Mexico on the south.

Ground water quality is generally good, although hard to very hard. Total dissolved solids in the aquifer have risen significantly since the early 1900s, and in some areas, the water may exceed drinking water standards for sulfate, chloride, fluoride, iron and arsenic. These concentrations may be naturally derived from geologic sources. Shallow aquifers may contain elevated levels of nitrates and atrazine.



Era	System	Series	Stratigraphic Unit	Unit Thickness (feet)	Physical Characteristics	Hydrogeologic Unit	Hydrologic Characteristics
Cenozoic	Quaternary	Holocene and Pleistocene	Valley-fill deposits	0 to 60	Stream deposits of gravel, sand, silt, clay associated with the most recent cycle of erosion and deposition along present streams	High Plains aquifer	Shallow water-table aquifer(s). Well yields range from 500 to more than 1,000 gpm in several river valleys
			Dune sand	0 to 300	Fine to medium sand with small amounts of clay, silt, and coarse sand formed into hills and ridges by the wind		Typically lies above the water table; has a high infiltration rate and is important for ground-water recharge
			Loess	0 to 250	Silt with lesser amounts of very fine sand and clay deposited as windblown dust		Lies above the water table and does not yield water; serves for minor recharge
		Pleistocene	Unconsolidated alluvial deposits	0 to 550	Stream deposits of gravel, sand, silt, and clay locally cemented by calcium carbonate into caliche or mortar beds		Primary portion of the High Plains aquifer; mostly unconfined; yields range from 100 to 3,100 gpm; typically less than 300 gpm in Colorado; Ogallala is the most significant High Plains aquifer resource
	Tertiary	Miocene	Ogallala Formation	0 to 700	Poorly sorted clay, silt, sand, and gravel generally unconsolidated; forms caliche layers or mortar beds when cemented by calcium carbonate; Ogallala makes up large part of High Plains aquifer		
			Arikaree Group	0 to 1,000	Predominantly massive, very-fine to fine-grained sandstone with localized beds of volcanic ash, silty sand, siltstone, claystone, sandy clay, limestone, marl, and mortar beds; part of the High Plains aquifer		Can be confined; moderately permeable. May yield up to 200 gpm in localized areas
		Oligocene	White River Group	0 to 700	Upper unit, Brule Formation, is considered part of the High Plains aquifer in Colorado, predominantly massive sandstone containing sandstone beds and channel deposits		Typically confined, except at outcrop; yields typically less than 100 gpm
					Lower unit, Chadron Formation, mainly consists of varicolored, bentonitic, loosely to moderately cemented clay and silt		Chadron is mostly impermeable

From Gutentag and others, 1984

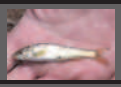


Geology

The North Fork of the Republican River lies within the Ogallala formation, and cover Cretaceous Pierre shale on the eastern edge of the watershed. The smooth tablelands adjacent to the river consist of Quaternary alluvium and Eolian sands.

Threatened & Endangered Species

State & Federally Threatened, Endangered & Candidate Species as well as Species of Special Concern in North Fork Republican Watershed.

	Common Name	Scientific Name	Class	State	Federal	Comments
	**Bald Eagle**	*Haliaeetus leucocephalus*	Birds	**Threatened**	**None**	May migrate through watershed
	**Black-footed Ferret**	*Mustela nigripes*	Mammals	**Endangered**	**Endangered**	No current records of occurrence
	**Black-tailed Prairie Dog**	*Cynomys ludovicianus*	Mammals	**Concern**	**None**	Occurs in the watershed
	**Brassy Minnow**	*Hybognathus hankinsoni*	Fish	**Threatened**	**None**	Occurs in the watershed
	**Burrowing Owl**	*Athene cunicularia*	Birds	**Threatened**	**None**	Occurs in the watershed
	**Common Garter Snake**	*Thamnophis sirtalis*	Reptiles	**Concern**	**None**	Occurs in the watershed
	**Cylindrical Papershell**	*Anodontoides ferussacianus*	Gastropods	**Concern**	**None**	May occur in the watershed
	**Ferruginous Hawk**	*Buteo regalis*	Birds	**Concern**	**None**	Occurs in the watershed
	**Long-Billed Curlew**	*Numenius americanus*	Birds	**Concern**	**None**	Occurs in the watershed
	**Mountain Plover**	*Charadrius montanus*	Birds	**Concern**	**None**	Occurs in the watershed
	**Northern Cricket Frog**	*Acris crepitans*	Amphibians	**Concern**	**None**	Occurs in the watershed
	**Northern Leopard Frog**	*Rana pipiens*	Amphibians	**Concern**	**None**	May occur in the watershed
	**Plains Leopard Frog**	*Rana blairi*	Amphibians	**Concern**	**None**	Occurs in the watershed
	**Plains Minnow**	*Hybognathus placitus*	Fish	**Endangered**	**None**	Occurs in the watershed
	**Plains Orangethroat Darter**	*Etheostoma spectabile*	Fish	**Concern**	**None**	Occurs in the watershed
	**Stonecat**	*Noturus flavus*	Fish	**Concern**	**None**	May occur in the watershed
	**Suckermouth Minnow**	*Phenacobius mirabilis*	Fish	**Endangered**	**None**	Occurs in the watershed
	**Swift fox**	*Vulpes velox*	Mammals	**Concern**	**None**	Occurs in the watershed

Shortgrass prairie, sandsage-mixed grass rangeland, and both irrigated and dry cropland are the dominant terrestrial habitat type in this watershed. Burrowing owl, mountain plover, black-tailed prairie dog, and swift fox are representative species for the shortgrass habitat. Greater prairie chickens use the sand sage-mixed grass rangeland habitats in the eastern half of the watershed. Water is scarce and the native species in this watershed are those that can survive without abundant water supplies. Riparian areas, playa lakes, and the occasional stock pond provide seasonal to intermittent aquatic habitats. Economically important wildlife species that occur in large areas of the watershed include black bullhead, green sunfish, pronghorn (antelope), mule and white-tailed deer, mourning dove, pheasant and greater prairie chicken. Bobwhite quail and snow geese occur in the Republican River riparian area.

Social Data	Logan	Phillips	Washington	Yuma
Demographics (US Census, American Factfinder)				
Total population		4,480	4,926	9,841
Male		2,164	2,504	4,840
Female		2,316	2,422	5,001
Median age (years)		39.8	40.2	37.3
White		4,168	4,748	9,267
Black or African American		9	2	11
American Indian and Alaska Native		13	28	28
Asian		18	5	7
Native Hawaiian and Other Pacific Islander		1	1	2
Some other race		211	100	407
Hispanic or Latino (of any race)		527	310	1268
Economic Characteristics (US Census, American Factfinder)				
In labor force (population 16 years and over)		2,039	2,400	4,919
Median household income (dollars)		32,177	32,431	33,169
Median family income (dollars)		38,144	37,287	39,814
Per capita income (dollars)		16,394	17,788	16,005
Families below poverty level		110	121	235
Individuals below poverty level		507	555	1244
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)				
Farms (number)	930	334	861	864
Land in farms/ranches (acres)	1,111,135	470,837	1,408,583	1,351,010
Average size farm/ranch (acres)	1,195	1,410	1,636	1,567
Median size farm (acres)	608	1,000	865	1,000
Average age of farmer or rancher	52.8	53.4	55.4	52.7
Net cash return from ag sales ($1,000)	5,092	13,313	2,612	58,023
Cattle and calves (number)	185,000	30,000	60,000	250,000

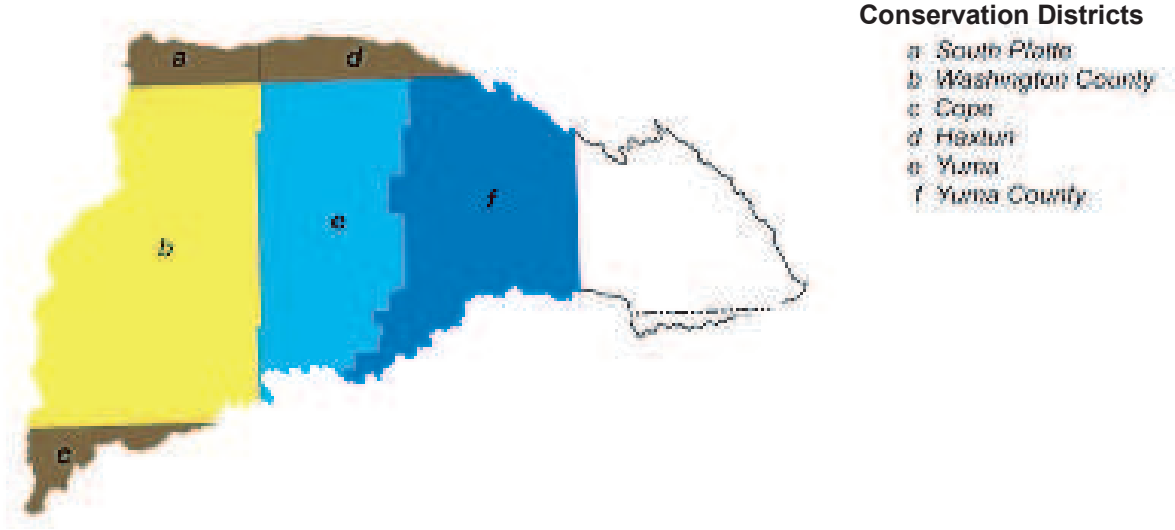
Natural Resource Concerns

I. Resource Concerns Identified by Conservation Districts

Resource Concern By Priority	South Platte	Washington County	Cope	Haxtun	Yuma	Yuma County	Totals
Soil Erosion	5		5	5	4	4	23
Water Quality	4		4	3	5	5	21
Water Quantity				4	5		9
Rangeland Health and Productivity			3		3	2	8
Plants-Invasive Species	3			2		3	8
Agricultural Production		5					5
Conservation issues		4					4
Conservation Tree Planting	2		2				4
Wildlife Habitat				1			1
Animal Management						1	1

Notes:

The Conservation Districts identified and prioritized these resource concerns during facilitated public meetings held between 1998 and 2000 and are part of the Conservation District's Long Range Plans. Higher scores indicate higher priority



II. Identified Resource Concerns and Issues from other sources

NRCS staff, Colorado State University, and other area resources

Water Quantity - meeting Republican River Compact requirements

Conversion from high water use crops to lower water use crops

Invasive weeds

Wind erosion

Selected Conservation Application Data

North Fork Republican Watershed—10250002

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	166,576	118,418	Not Avail.	34.682	23,497	32,794	375,967
Total Conservation Systems Applied (Acres)	57,211	83,561	Not Avail.	44,562	51,346	69,107	305,787
Practices							
Prescribed Grazing	8,342	3,116	4,200	10,909	11,863	30,452	68,882
Upland Wildlife Habitat Management	6,558	14,635	11,621	380	2,048	6,319	41,561
Conservation Cropping System	Not Avail.	Not Avail.	3,406	3,982	6,936	7,511	21,835
Residue Management	4,408	12,316	13,702	10,430	4,086	3,070	48,012
Irrigation Water Management	3,298	13,028	9,510	3,248	3,986	6,195	32,279

Conservation Systems to Address Major Resource Concerns

Primary Resource Concern:	**Rangeland Health**			
Conservation System Description:	Prescribed Grazing—Planned management that provides adequate recovery opportunity between grazing events and proper stocking of animals. Estimate 600,000 acres need to be treated on median sized ranches of 3,500 acres.			**Based on Conservation System Guide Code:** CO 67B.1-GR-01-R-Grazing
Practices	**Unit**	**Quantity**	**Cost/Unit ($)**	**Estimated Cost per Median Sized Ranch ($)**
Prescribed Grazing				
Fencing (382)	Ft.	21,200	.40	8,480
Pipeline (516)	Ft.	2,000	2.40	4,800
Upland Wildlife Habitat Management (645)	Ac.	300	na	0
Watering Facility (614)	No.	2	410	820
Costs to apply prescribed grazing per median sized ranch of 3,500 acres	No.	150	66,700	
			Subtotal Rangeland costs:	**$2,115,000**

Conservation Systems to Address Major Resource Concerns (cont'd)

Primary Resource Concern:	Dry Cropland, Residue Management Seasonal with Terraces			
Conservation System Description:	HEL cropland with wind erosion as a major resource concern. Conservation system includes crop rotation, terraces, seasonal residue management, and nutrient and pest management.			**Reference Conservation System Guide Code:** CO 72.1-CR-Dryland –R-1
Practices	**Unit**	**Quantity**	**Cost/Unit ($)**	**Estimated Cost ($)**
Conservation Crop Rotation (328)	Ac.	8,400	0.50	4,200
Nutrient Management (590)	Ac.	1,000	5.00	5,000
Pest Management (595)	Ac.	1,000	15.00	15,000
Residue Management, Seasonal (344)	Ac.	1,000	5.00	5,000
Terrace (600)	Ft.	9,000	1.20	10,800
Estimate 70,000 acres need to be treated on median sized farms of 1000 acres. Cost to apply dryland crop conservation system per median sized farm of 1000 acres:	No.	70	40,000	2,800,000
			Subtotal Costs Dryland Crops:	**$2,800,000**

Primary Resource Concern:	**Water Quality**			
Conservation System Description:	Upgrading sprinkler irrigation systems with IWM, crop rotation, Nutrient and Pest Management			**Reference Conservation System Guide Code:** CO 72.1-CR-Sprinkler-R-2
Practices	**Unit**	**Quantity**	**Cost/Unit ($)**	**Estimated Cost ($)**
Irrigation Water Management (449) (includes re-bowl, renozzle, and IWM)	Ac	33,000	10.20	336600
Nutrient Management (590)	Ac	62,000	5	310000
Pest Management (595)	Ac	62,000	15	930000
				Subtotal Irrigation Costs $1,576,600

General Effects, Impacts, and Estimated Costs of Application of Conservation Systems

Landuse	**Resource Concern**	**Measurable Effects**	**Non-measurable Effects**	**Estimated Cost ($)**
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage, and shelter. Wildlife habitat is sustained or improved.	**2,115,000**
Dryland Crop	Soil	315,000 Total Tons/Year saved	Cropland sustainability	**2,800,000**
Irrigated Crop	Water		Nutrients and organics are stored, handled, disposed of, and managed so that surface water uses are not adversely affected.	**1,576,600**
			Estimated Total Costs to Address Major Resource Concerns:	**$6,491,600**

References Not Cited in Document

303(d) listed streams within Big Sandy Watershed were created using data from Colorado Department of Public Health & Environments' Water Quality & Control Commission. Impaired streams are current as of April 30, 2006. For a list of all Colorado impaired streams, locations and priority ratings, visit http://www.cdphe.state.co.us/regulations/wqccregs/100293wqlimitedsegtmdls.pdf.

Threatened and Endangered Species information was gathered using data from the Colorado Division of Wildlife (CDOW) Natural Diversity Information Source (NDIS).

Resource Concerns were identified using the Colorado Association of Conservation Districts' (CACD) long range (10 year) plans from the period of 1996-2000. For more information on Colorado's Conservation Districts, visit http://www.cacd.us.

Maps were generated using Soil Survey Geographic Database (SSURGO) tabular and spatial data. SSURGO data was downloaded for the following Colorado & Nebraska surveys:

Logan County (CO075) Published 01/30/2008
Phillips County (CO095) Published 01/30/2008
Washington County (CO121) Published 01/10/2007
Yuma County (CO125) Published 08/07/2007
Dundy County (NE057) Published 01/17/2007

To download SSURGO data, visit http://soildatamart.nrcs.usda.gov. The surveys were then loaded into Soil Data Viewer http://soildataviewer.nrcs.usda.gov (a tool built as an extension to ArcMAP for quick geospatial analysis of soil data for use in resource assessment) and the subsequent data was exported to a GIS shapefile.

Vegetation data was generated using the Colorado Division of Wildlife's "Colorado Vegetation Classification Project" (CVCP) data. visit http://ndis.nrel.colostate.edu/coveg.

Common Resource Area (CRA), a subdivision of the Major Land Resource Area (MLRA), is a geographical area where resource concerns, problems, or treatment needs are similar. For more information on Common Resource Areas visit http://soils.usda.gov/survey/geography/cra.html.

Average Annual Precipitation data was developed through a partnership between the Natural Resources Conservation Service's (NRCS) National Water and Climate Center (NWCC), the National Cartography and Geospatial Center (NCGC), and the PRISM (the Parameter-elevation Regressions on Independent Slopes Model) group at Oregon State University (OSU), developers of PRISM. Mean annual precipitation maps were developed calculating averages of rainfall for the period of 1961-1990. For more information visit http://www.ncgc.nrcs.usda.gov/products/datasets/climate/docs/fact-sheet.html or http://www.ocs.orst.edu/prism.

Land Ownership (status, 2004 dataset) data was obtained from the Colorado Department of Transportation (CDOT). For more information, visit http://www.dot.state.co.us.

Relief & Elevation maps were created using the National Elevation Dataset (NED), 30m Digital Elevation Model (DEM) raster product assembled by the U.S. Geological Survey (USGS). The data was downloaded from the NRCS Geospatial Data Gateway at http://datagateway.nrcs.usda.gov.

Conservation Systems to address major resource concerns were extracted from the Conservation Systems Guides (CSG) compiled from local conservationists by the NRCS Ecological Sciences Section at the Lakewood State Office.

Effects and Impacts of application of conservation systems were extracted from Colorado eFOTG, Section III, Resource Quality Criteria, NRCS, Colorado, March 2005.